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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Green		
Serial No.:	09/389,939		
Filed:	September 3, 1999		
For:	FINANCIAL INSTRUMENT FILTERING SYSTEM AND METHOD THEREFOR		
Art Unit:	3627	Attorney Docket No.:	321.5452USU
Examiner:	Cuff, Michael A.	Customer No.:	27623

DECLARATION UNDER RULE 132 OF DR. MATTHEW O. WARD

Commissioner for Patents
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Dr. Matthew O. Ward declares as follows:

1. I am a Professor on the faculty of Worcester Polytechnic Institute (WPI) in Worcester, Massachusetts. I was appointed to the faculty in 1986, appointed as an Associate Professor in 1992 and appointed as a Professor in 2000.

2. I currently teach courses entitled Human-computer Interaction, Computer Graphics (undergraduate and graduate), Computer Animation and Advanced Computer Graphics.

3. My research interests include visualization research that at WPI is focussed primarily on the development and testing of new tools for the interactive exploration of multivariate data.

4. I am a named author on the following invited papers and publications in the field of visualization technology:

Invited Papers

"Applications of Dynamic Scene Analysis to Robotics", Proc. of IEEE Conference on Computer Software and Applications, pp. 392-399, 1982.

"Images for Testing Automated Pavement Surface Distress Evaluation Systems", N. Wittels, T. El-Korchi, M. Gennert, and M. O. Ward, Proceedings of Automated Pavement Distress Data Collection Equipment Seminar, pp. 153-164, 1990.

"An Engineering Approach to Automated Pavement Surface Distress Evaluation", N. Wittels, T. El-Korchi, M. Gennert, and M. O. Ward, Proceedings of Automated Pavement Distress Data Collection Equipment Seminar, pp. 165-179, 1990.

"Graphics and Imaging: Trends Toward Unification?", Panel Position Paper, at Visualization '90 Conference, pp. 407-410, 1990.

"An Expert System for Visual Inspection of IC Leadframes", M. O. Ward and G. Dainis, Proc. World Congress on Expert Systems, 1991.

"Visualization Research at W.P.I.", M. O. Ward, Computer Graphics, Vol. 26, No. 3, pp. 186-187, 1992.

"The Gaea System: a Spatio-Temporal Database System for Global Change Studies", N. Hachem, M. Gennert, and M. O. Ward, Proc. of American Association for the Advancement of Science Annual Meeting, pp. 84-89, Feb. 1993.

"An Overview of the Gaea Project", N. Hachem, M. Gennert, and M. O. Ward, IEEE Data Engineering Journal, pp. 29-32, March 1993.

"Distributed Database Management for Scientific Data Analysis", N. Hachem, M. Gennert, and M. O. Ward, Proc. Int. Workshop on Global GIS, Tokyo, pp. 85-93, Aug. 1993.

"Perceptual Benchmarking for Multivariate Data Visualization", M. O. Ward and K. J. Theroux, Proc. Dagstuhl Seminar on Visualization, June, 1997.

"Creating and Manipulating N-Dimensional Brushes", M. O. Ward, Proc. Joint Statistical Meeting, pp. 6-14, August, 1997.

"Visualization Tools and Database Structures for Hierarchical Exploration of Large Data Sets ", M. O. Ward, Proc. CODATA Euro-American

Workshop on Management of Data, Information, and Knowledge, Paris, 1999.

Refereed Publications

"A Pictorial Database Management System which uses Histogram Classification as a Similarity Measure", M. O. Ward and Y. T. Chien, Proc. IEEE Conference on Computer Software and Applications, p. 153-156, 1979.

"Analysis of Time-Varying Imagery through the Representation of Position and Shape Changes", M. O. Ward and Y. T. Chien, Proc. of International Conference on Pattern Recognition, pp. 1236-1244, 1980.

"Occlusion Analysis in Time-Varying Imagery", with Y. T. Chien, Proc. IEEE Conference on Pattern Recognition and Image Processing, pp. 504 - 511, 1981.

"The Automated Design of Task-Specific Parallel Processing Architectures", Proc. of International Parallel Processing Conference, pp. 298-300, 1982.

"Assigning Parallel-Executable, Intercommunicating Subtasks to Processors", M. O. Ward and D. J. Romero, Proc. of International Parallel Processing Conference, pp. 392-399, 1984.

"Rule-Based Inspection of Leadframes", G. A. Dainis and M. O. Ward, Proc. of IEEE Conference on Computer Vision and Pattern Recognition, pp. 580 - 585, 1988.

"Exploring N-Dimensional Databases", J. LeBlanc, M. O. Ward, and N. Wittels, Proc. of First IEEE Conference on Visualization (Visualization '90), pp. 230 - 237, 1990. Reprinted in Designing a Visualization Interface for Multidimensional, Multivariate Data, (J. Beddow, C. Beshers), Tutorial Notes at Visualization 92.

"Lighting Design for Automated Pavement Surface Distress Evaluation", T. El-Korchi, M.A. Gennert, M. O. Ward, and N. Wittels, Transportation Research Record, No. 1311, pp. 144-148, 1991.

"The Visual Comparison of Three Sequences", K. Hinckley and M. O. Ward, Proc. of Second IEEE Conference on Visualization, pp. 179-186, October, 1991.

"Testing Pavement Image Processing Systems: An Engineering Approach", M. O. Ward, N. Wittels, T. El-Korchi, and M. Gennert, Proc. of

Conference on Road and Airport Pavement Response Monitoring Systems, pp. 41-62, 1991.

"Shadow Identification", C. Jiang and M. O. Ward, Proc. IEEE Conference on Computer Vision and Pattern Recognition, pp. 606-612, June, 1992.

"Providing Temporal Support in Data Base Management Systems for Global Change Research ", K. Qiu, N. Hachem, M. Gennert, and M. O. Ward, Proc. Sixth International Working Conference on Scientific and Statistical Database Management, pp. 274-289, June, 1992.

"Shadow Segmentation and Classification in a Constrained Environment", C. Jiang and M. O. Ward, CVGIP: Image Understanding, Vol. 59, No. 2, pp. 213-225, March 1994.

"Visualizing Relationships between Nucleic Acid Sequences using Correlation Images", D. Nedde and M. O. Ward, Computer Applications in the Biosciences, Vol. 9, No. 3, pp. 331 - 336, June, 1993.

"A Visual Programming Environment for Supporting Scientific Data Analysis", Y. Zhang, M. O> Ward, N. Hachem, and M. Gennert, Proc. 1993 Symposium on Visual Languages, pp. 368-370, August, 1993.

"Managing Derived Data in the GAEA Scientific DBMS", N. Hachem, K. Qiu, M. Gennert, and M. O. Ward, Proc. 1993 VLDB Conference, pp. 1-12, 1993.

"Peer Learning in an Introductory Computer Science Course", C. Wills, D. Finkel, M. Gennert, and M. O> Ward, Proc. SIGCSE conference, pp. 309-313, March, 1994.

"N-Land: a Graphical Tool for Exploring N-Dimensional Data", M. O. Ward, J. LeBlanc and R. Tipnis, Proc. CG International Conference, June, 1994.

"XmdvTool: Integrating Multiple Methods for Visualizing Multivariate Data", Proc. Visualization '94, pp. 326-333, October, 1994.

"From Databases to Visualization - Providing a User Friendly Visual Environment for Creating 3D Solid Geology Models", T. Lin, M. O. Ward, W.L. Power, and D.M. Landy, Proc. APCOM '95 (published in AusIMM Bulletin), pp. 11-20, July, 1995.

"High Dimensional Brushing for Interactive Exploration of Multivariate Data", A. R. Martin and M. O. Ward, Proc. Visualization '95, pp. 271 - 278, November, 1995.

"Animating Multidimensional Scaling to Visualize N-Dimensional Data Sets ", C. Bentley and M. O. Ward, Proc. InfoVis '96, pp. 72-73, October, 1996.

"A Computational Environment for the Management, Processing, and Analysis of Geological Data ", M. O. Ward, W. L. Power and P. Ketelaar, Computers & Geosciences, Vol. 22, No. 10, pp. 1123-1131, December 1996.

"Visualization of Cyclic Multivariate Data ", B. Lipchak and M. O. Ward, Proc. Visualization '97 Late Breaking Hot Topics, pp. 61-64, October 1997.

"FED - a Framework for Iterative Data Selection in Exploratory Visualization ", R. Resnick, M. O. Ward, and E. A. Rundensteiner, Proc. of Tenth International Conference on Scientific and Statistical Database Management (SSDBM 98), pp. 180-189, July, 1998.

"Matching Fires and Simulations ", J. R. Barnett, M. O. Ward, and J. Govindarajan, NIST Annual Conference on Fire Research, pp. 13-14, November, 1998.

"A Visualization Tool for Exploratory Analysis of Cyclic Multivariate Data ", M. O. Ward and B. N. Lipchak, Metrika, Vol. 51, No. 1, pp. 27-38, 2000.

"Graphical Simulation of Early Development of the Cerebral Cortex", E. F. Ryder, L. Bullard, J. Hone, J. Olmstead, and M. O. Ward, Computer Methods and Programs in Biomedicine, Vo. 59, pp. 107-114, 1998.

"Visualizing Simulated Room Fires ", J. Govindarajan, M. O. Ward, and J. R. Barnett, Proc. IEEE Conference on Visualization, pp. 475-478, October, 1999.

"Hierarchical Parallel Coordinates for Visualizing Large Multivariate Data Sets ", Y. Fua, M. O. Ward, and E. A. Rundensteiner, Proc. IEEE Conference on Visualization, pp. 43-50, October, 1999.

" Navigating Hierarchies with Structure-Based Brushes ", Y. Fua, M. O. Ward, and E. A. Rundensteiner, Proc. IEEE Symposium on Information Visualization, pp. 58-64, October, 1999.

" Scalable Visual Hierarchy Exploration ", D. Stroe, E. A. Rundensteiner, and M. O. Ward, Proc. DEXA 2000, September, 2000.

" Structure-Based Brushes: A Mechanism for Navigating Hierarchically Organized Data and Information Spaces ", Y. Fua, M. O. Ward, and E. A. Rundensteiner, IEEE Trans. Visualization and Computer Graphics, 2000.

" Hierarchical Exploration of Large Multivariate Data Spaces ", M. O. Ward, Y. Jing, and E. A. Rundensteiner, Proc. Dagstuhl Seminar on Scientific Visualization, May, 2000.

"Computational methods for single-point and multipoint analysis of genetic variants associated with a simulated complex disorder in a general population ", C. Shoemaker, M. Pungliya, M. Sao Pedro, C. Ruiz, S. Alvarez, M. Ward, E. Ryder, and J. Krushkal, Genetic Epidemiology Vo. 21, pp. S738-S745, 2001.

"A particle visualization framework for clustering and anomaly detection," I. Davidson and M. Ward, Proc. KDD Workshop on Visual Data Mining, Sept. 2001.

"Introduction to Data Visualization ", G. Grinstein and M. Ward, invited chapter in "Information Visualization in Data Mining and Knowledge Discovery," edited by U. Fayyad, G. Grinstein, and A. Wierse (2002).

"Visual Data Mining Techniques", D. Keim and M. Ward, invited chapter in "Intelligent Data Analysis: An Introduction", edited by Michael Berthold and David Hand (in press).

"XmdvTool: Visual Interactive Data Exploration and Trend Discovery of High-dimensional Data Sets," E. Rundensteiner, M. Ward, J. Yang, and P. Doshi, ACM SIGMOD CONFERENCE 2002, demonstration paper, Wisconsin, June 2002.

"Interactive hierarchical displays: a general framework for visualization and exploration of large multivariate data sets," J. Yang, M. Ward, and E. Rundensteiner, Computers and Graphics (accepted for publication).

"Interring: a radial, space-filling hierarchy visualization system with a set of navigation, modification, and selection tools," J. Yang, M. Ward, and E. Rundensteiner, IEEE Symposium on Information Visualization (accepted for publication).

5. I have a B. S. in Computer Science from WPI, a M. S. in Computer Science from the University of Connecticut and a Ph. D. in Computer Science from the University of Connecticut.

6. I have read the following documents:

1. The above identified patent application

2. Office Action dated March 11, 2003
3. Amendment filed on May 21, 2003
4. Office Action dated September 10, 2003
5. U.S. Patent No. 5,774,878 (Marshall)
6. U.S. Patent No. 5,918,217 (Maggioncalda)
7. U.S. Patent No. 4,221,003 (Chang)

7. The present invention as described in the above noted application is directed to an interactive method and system for searching a universe of financial instruments. The method and system are interactive in the sense that a user is enabled to perform a sequence of filter passes of the universe using a graphical interface by specifying the filter conditions for each pass. The user is enabled to select the filter conditions for each pass from a set of filter parameters that are presented on the graphical interface. A preview of the current filter pass is also simultaneously presented on the graphical interface so that the user has instantaneous feedback prior to running the filter pass. This enables the user to make a decision to go with the selected filter pass or to change it before the filter pass is run. A current filter pass includes a currently selected filter parameter as well as all the filter parameters of previously run filter passes. This results in each successive filter pass eliminating hits until a manageable number of hits is reached. The preview enables the user to make changes in one interactive session. Without the preview, the user does not learn the results until after the filter pass is run. To make a change after the filter pass is run may entail rerunning the entire filter pass sequence.

8. The Examiner states at page 4 of the Office Action dated March 11, 2003 that "the term 'histogram' is a broadly defined term." This statement is indefinite because it fails to give the broad definition. However, a histogram is a specific type of chart. The Random House Webster's College Dictionary, New York Random House, 1991, at page 636 defines histogram as:

"n. a bar graph of a frequency distribution in which the bars are displayed proportionate to the corresponding frequencies."

Based on my experience, the above dictionary definition is accurate and accepted as accurate and unambiguous in the art. A histogram includes bars and the bars are proportional to different frequencies. The charts shown in Figs. 2-20 and 24-26 of the present application are histograms that show bars for different values of a total return per annum. Each bar has a height that is proportional to the frequency or number of hits of the universe for the associated value.

9. The Examiner also states at page 4 of the Office Action dated March 11, 2003 that "Marshall's figure 3a-3d does show frequency of occurrence groupings and some of the populations have bars." This statement is not true. Marshall's Figures 3a-3d depict a screen display generated by the virtual reality generator 4. The screen display has a plurality of metaphors, each representing a different financial instrument. The metaphors are grouped by industry along one axis. The metaphor industry grouping is not a bar proportional to a frequency. In fact, it is up to the viewer to group and count the graphical objects to attain a frequency of occurrence. Thus, the metaphor arrangement shown in Figures 3a-3d is not a histogram as described in the above noted application and recited in the current claims thereof.

10. Marshall discloses an apparatus that processes a stream of financial input data and displays selected parts of the data in a virtual world. The apparatus includes a user interface module 5, a data input module 8, a configuration file 6 and a virtual reality generator 4. The user interface module 2 controls an interface panel 20 that is shown in Fig. 2. The interface panel 20 has a virtual world indicator 22 that allows the user to nominate which virtual reality world the user desires to define or view. Up to 10 virtual reality worlds can be created and saved. Once defined by the user, a virtual reality world is saved and retrieved

using the virtual reality indicator. Marshall allows the user to define a static filter that filters the input data on a one-time basis. The filter definition process defines a single pass filter. There is no display or preview of the results of the single filte pass given to the user prior to creation of the virtual world configuration and its storage by operation of mix switch 24. Thereafter, the virtual reality display is rendered for the first time pursuant to step 152 of the simulation loop as shown in Fig. 4. The action step 152 is related to a universe (column 14, lines 17-20), which is the single universe of financial instruments defined by the single pass filter. The universe or result of the single filter pass is not modifiable while the user is viewing the virtual reality world. If the user is dissatisfied with the resultant universe, the recourse is to create a new virtual reality world by exiting the present virtual reality world. That is, the metaphors of the resultant universe cannot be changed or treated by subsequent filters and the user must exit to design a new filter and create a separate virtual reality world.

11. Marshall does not disclose, suggest or teach a multi-pass filter of the financial instruments.

12. Chang discloses a relational database in which search time efficiencies are attained based on tabular data structures. It is my professional opinion that one skilled in the art of virtual reality would not look to the relational database art of Chang, as the two arts are completely non-analogous technologies or disciplines that provide no reasonably supportable reason to combine Marshall and Chang as contended by the Examiner at Paragraph No. 6 of the Office Action of September 10, 2004. It is my opinion that the Examiner has simply taken totally non-analogous technologies in a hindsight attempt to reconstruct what is recited in current claims 18-21 and 24-27 of the above noted application. Even if the hindsight reconstruction of Marshall and Chang were permissible, the resultant combination would fail to describe or suggest the following elements, separately or in combination, of claims 18-21 and 24-27:

1. performing a plurality of filter passes,
2. presenting on the viewing screen a population chart showing the population of the financial instruments based upon the proposed filter condition of an i^{th} filter pass,
3. proposed filter condition including, inter alia, all filter conditions of previously performed ones of the filter passes,
3. repeating the steps until the n^{th} filter pass has been performed,
4. wherein the population chart is a histogram,
5. wherein the plurality of investment parameters and the histogram are concurrently presented on the viewing screen,
6. presenting on the viewing screen a parameter limiter that is user selectable to limit a selected investment parameter, and/or
7. wherein the parameter limiter is one of a plurality of parameter limiters being presented on the viewing screen.

13. Maggioncalda discloses a user interface for a financial advisory system that presents to a user a window (Fig. 4) that displays one or more decision variable inputs and a bar chart. The user provides values for the decision variable inputs and the bar chart shows a percentage distribution of the user's wealth among several mutual funds based on the values. It is my professional opinion that Maggioncalda's bar chart is not a population chart in which the bars are displayed proportionate to corresponding frequencies and, therefore, is not a histogram.

14. It is also my professional opinion that one skilled in the virtual reality world art of Marshall or in the relational database art of Chang would neither look to the financial advisory art of Maggioncalda nor find any reasonably supportable reason to combine three so distinctly different technologies in an attempt to recreate the invention described in the above noted application and recited in claims 22, 23, 28 and 29 thereof. It is my opinion that the Examiner has simply taken totally non-analogous technologies in a hindsight attempt to reconstruct

what is recited in current claims 22, 23, 28 and 29 of the above noted application. Even if the hindsight reconstruction of Marshall, Chang and Maggioncalda is permissible, the resultant combination would fail to describe or suggest the elements, separately or in combination, of claims 22, 23, 28 and 29 as discussed in Paragraph Nos. 10-12 above, as well as the following elements:

1. the plurality of investment parameters and parameter limiters being presented in a first area of the viewing screen and the histogram being presented in a second area of the screen, and/or
2. the n filter passes being combined with an additional filter pass having filter conditions selected from a plurality of investment categories of the financial instruments.

15. With respect to current claims 42 and 44-46, Marshall clearly lacks the following elements, separately or in combination:

1. presenting a histogram having a plurality of display elements that represent different groupings of an investment parameter, wherein the groupings are frequency of occurrence groupings,
2. identifying for each display element a filter condition for the investment parameter,
3. presenting an associated actuator for each filter condition for selective actuation by a user,
4. wherein the filter condition is a parameter limiter,
5. wherein the display elements are bars, and/or
6. presenting another histogram that includes another plurality of display elements that represent the investment parameter filtered by a selected one of the filter conditions.

16. With respect to current claim 47, Marshall does not disclose or suggest at least steps (b) and (c). In my professional opinion, the Examiner's assertion that

Marshall discloses a histogram is erroneous for the reasons discussed above in Paragraph Nos. 8 and 9. It is further my professional opinion that Marshall fails to disclose or suggest presenting concurrently with the filter parameters a preview of a result of the filter pass for the reasons set forth above in Paragraph No. 10. Moreover, in my opinion, the Examiner's contention that "preview" is not relevant to claim 47 is incomprehensible and erroneous. A preview would be accepted by one skilled in the art as meaning a look at a result of the selected first filter pass before actually performing the first filter pass. This is clearly set forth in claim 47, especially in view of step (c), which recites that the first filter pass is not performed until a user command is given after the preview is presented.

17. The system of the above noted application is data driven in that the filtering decisions made by the user are based on the data. In contrast, in Marshall's system the decisions made by the user are not based on the data, because Marshall's system does not operate on the data until after the filter decision is made and the action step 152 causes the virtual reality world to be rendered.

15. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Subscribed this 8th day of January, 2004.

Matthew O. Ward

Dr. Matthew O. Ward